Adaptive learning environment

From Telearn Thesaurus

Draft 1

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Contents

Definition

Adaptive Learning Environments are environments personalizing the instructional process on different instructional parameters as: sequence of tasks and task difficulty, time and type of feedback, pace of learning speed, reinforcement plan and others.

Comments on the history

Personalization of feedback and instruction has often been considered as a key feature in learning support. The adaptations of the instructional process to the individual and its different aspects have been investigated from different research perspectives as learner modelling, intelligent tutoring systems, adaptive hypermedia, adaptive instructional designs and others.

From the area of adaptive instruction and the psychology of learning adaptive methods and techniques in learning machines have been introduced and evaluated since 1950's.These adaptive methods have been empirically evaluated and showed to increase learning speed and help students for better understanding through individualized instruction.

Research in Intelligent Tutoring Systems (ITS) discussed such topics as acquiring information about the learning process, building cognitively adequate learner models, inferring information about learners, and developing effective recommendation and guidance strategies for personalized learning paths. In order to provide individualized feedback and support the development of problem solving competence in the target domains, ITSs are basically built on expert models of the problem domain. (Anderson, Conrad, & Corbett, 1989).

From early 90's educational adaptive hypermedia systems (Brusilovsky, 1996) have been using mostly simpler models of learner knowledge and preferences to adapt presentation of hypermedia content, annotation of hyperlinks, sequencing of learning contents, or content recommendation. Early works taking into account social information for giving instructional guidance also came from the field of adaptive hypermedia as for example using information about the usage of learning content by other members of a learning community or peer group members.

In the last ten years the technology available and used by learners has dramatically changed. From simply taking into account the learner knowledge, preferences, goals, and other characteristics of the learner, the social context of learning has become much more important. Today adaptive learning environments start to make use of sensor information and other contextual information for supporting adaptation to the learners and their context of use. Furthermore social media have changed the availability of user information dramatically and using learning information for personalized reflection is a new development linked to research in Learning Analytics.

Related terms

Adaptive Systems, User Modeling, Adaptive Instruction, Adaptive Hypermedia

Translation issues

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Disciplinary issues

Research issues about the design and the evaluation of adaptive learning environments are strongly multidisciplinary, bringing together research from computer science and engineering, psychology and psychotherapy, cybernetics and system dynamics, instructional design and empirical research on technology enhanced learning.

While Computer Science perspectives mostly focus on the development of better user models, and development of intelligent adaptation and media systems and algorithms, educational sciences mostly focus on the development, acceptance and evaluation of adaptive instruction algorithms. Furthermore Aptitude Treatment Interaction studies explored the effects of adapting instructional parameters to different characteristics of the learner (Tennyson & Christensen, 1988) as task performance, personality characteristics, or cognitive abilities.

The complexity which is raised by the convergence or possible conflicts between disciplines involved in research on adaptivity could be structured along methodological questions distinguishing means, target, goal and strategy (Specht 1998):

- *Adaptation Mean*: What information about the user is known, and what information can be used for adaptation?
- *Adaptation Target*: What aspect of the instructional system is adapted to the given information about the user?
- *Adaptation Goal*: Why does the system adapt to this information? Mostly, adaptive systems adapt to their user for ergonomic or pedagogical reasons.
- *Adaptation Strategy*: What steps are taken to adapt the system to the user, and how active or reactive

are the user and the system in the adaptation process?

Key references

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